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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In Re Application of:	
Rahul Aggarwal, et al.	Examiner: Uzma Alam
Application No.: 10/036,674	Art Unit: 2157
Filed: December 31, 2001	Confirmation No.: 4068
For: METHOD AND APPARATUS FOR REPRESENTING LABEL SWITCHED PATHS	

Mail Stop Amendment
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

AMENDMENT AND RESPONSE TO FINAL OFFICE ACTION

Sir:

In response to the Office Action mailed December 12, 2007, please enter the following amendments and consider the following remarks.

CLAIMS

This listing of claims will replace all prior versions, and listings, of claims in the application:

1-8. Canceled.

9. (Currently Amended) A method for a network element comprising:

maintaining, for network layer switched routes, interface structures each storing a set of network layer information;

distributing each of the interface structures to a set of one or more of a plurality of routing protocol modules;

maintaining a routing information base responsive to the plurality of routing protocol modules;

distributing forwarding information bases (FIBs) including network layer information to each of a plurality of line cards;

maintaining for each of a plurality of label switched paths (LSPs) ~~path (LSP)~~ a forwarding data structure that is separate from the interface structures and that does not include the set of network layer information; and

selectively distributing different ones of the forwarding data structures to different ones of the plurality of line cards to establish label forwarding information bases (LFIBs) devoid of network layer information, wherein the LFIBs are separate from the FIBs, wherein each forwarding data structure is selectively distributed to only the one of the plurality of line cards that is an ingress point into the network element for the LSP represented by that forwarding data structure. ~~said selectively distributing being done and said label forwarding information bases being created apart from distributing to the plurality of routing protocol modules and the routing information base a~~

~~subset of the forwarding data structures,wherein the selective distribution of a particular forwarding data structure to a particular line card is based on an ingress and an egress line card associated with the LSP represented by the particular forwarding data structure.~~

10. (Original) The method of claim 9 wherein the forwarding data structure includes a first field to indicate a port, a second field to indicate a slot, and a third field to indicate a flow.

11. (Original) The method of claim 10 wherein the port is a virtual port and the slot is a virtual slot.

12. (Original) The method of claim 9 further comprising maintaining for each forwarding structure, a data structure that indicates an egress slot and encapsulation information.

13. (Original) The method of claim 12 wherein the data structure further indicates an egress port.

14. (Original) The method of claim 12 further comprising distributing the egress slot and encapsulation information from different ones of the data structures to different ones of the line cards apart from distribution to the plurality of routing protocol modules and the routing information base.

15-17. Canceled.

18. (Currently Amended) A network element comprising:

a plurality of line cards;

a control card having stored therein,

a plurality of interface structures having stored therein network layer information;

a plurality of routing protocol modules coupled to one or more of the plurality of interface structures;

a routing information base (RIB) coupled to said plurality of routing protocol modules;

a plurality of forwarding data structures devoid of network layer information separate from the interface data structures, the plurality of forwarding data structures each having stored therein information to determine forwarding of packets from an ingress one of said plurality of line cards to an egress one of said plurality of line cards for a label switched path (LSP), ~~wherein a set of one or more of said plurality of forwarding data structures include data indicating that they represent a label switched path~~;

a label manager to selectively distribute different ones of the forwarding data structures to different ones of the plurality of line cards and to selectively distribute a subset of the plurality of forwarding data structures to the plurality of routing protocol modules, wherein ~~the selective distribution of~~ a particular one of the forwarding data ~~structure~~ structures is selectively distributed to a particular one of the line ~~card~~ cards only if that line card is an ingress point into the network element for the LSP ~~is based on an ingress and an egress line card associated with the label switched path~~ represented by the particular forwarding data structure; and

a first of said plurality of line cards having stored therein,

a label forwarding information base (LFIB) generated from at least certain of said plurality of forwarding data structures indicating that the first line card is an ingress point into the network element for the ~~they represent~~ label switched paths (LSPs) represented by the plurality of forwarding data structures, the label forwarding information base (LFIB) being devoid of network layer information; and

a network layer forwarding information base (FIB) generated from said routing information base (RIB).

19. (Original) The network element of claim 18 wherein said information includes a slot identifier, a port identifier, and a flow identifier.

20. (Original) The network element of claim 19 wherein the slot identifier of each forwarding structure indicates the same virtual slot and the port identifier for each forwarding structure indicates the same virtual port.

21. (Original) The network element of claim 18 wherein the control card further has stored therein a plurality of data structures, different ones of the plurality of data structures indicating different ones of said plurality of forwarding structures, egress slots, and encapsulation information.

22-55. Canceled.

56. (Currently Amended) A machine-readable medium that provides instructions, which when executed by a set of one or more processors, cause said set of processors to perform operations comprising:

maintaining in a control plane a first data structure that represents a label switched path (LSP), the first data structure indicating a virtual port, a virtual slot, and an identifier to distinguish LSPs of the virtual port and the virtual slot;

maintaining in the control plane a second data structure indicating the first data structure, a slot, encapsulation information, and an index for the slot and the encapsulation information;

selectively distributing the first data structure, the index, and an egress label identifier to only a ~~certain of a set of one or more~~ label forwarding information base (LFIB) on a first line card ~~bases (LFIBS)~~ in a data plane, the ~~LFIBS~~ LFIB being devoid of network layer information, and selectively distributing the first data structure, the index, and the egress label identifier to one or more routing protocol modules in the control plane, wherein the selective distribution to the LFIB ~~LFIBS~~ is based on an ingress point for the LSP ~~an ingress and an egress line card associated with the LSP~~; and

distributing the index and the encapsulation information to only an ~~certain of a set of~~ adjacency data ~~structures~~ structure on a second line card within the data plane based on an egress point for the LSP.

57. (Original) The machine-readable medium of claim 56 wherein the second data structure further indicates a port.

58. (Original) The machine-readable medium of claim 56 wherein the encapsulation information includes an egress label.

59. (Currently Amended) A machine-readable medium that provides instructions, which when executed by a set of one or more processors, cause said set of processors to perform operations comprising:

maintaining, for network layer switched routes, interface structures each storing a set of network layer information;

distributing each of the interface structures to a set of one or more of a plurality of routing protocol modules;

maintaining a routing information base responsive to the plurality of routing protocol modules;

distributing forwarding information bases (FIBs) including network layer information to each of a plurality of line cards;

maintaining for each of a plurality of label switched paths (LSPs) ~~path (LSP)~~ a forwarding data structure that is separate from the interface structures and that does not include the set of network layer information; and

selectively distributing different ones of the forwarding data structures to different ones of the plurality of line cards to establish label forwarding information bases (LFIBs) devoid of network layer information, wherein the LFIBs are separate from the FIBs, wherein each forwarding data structure is selectively distributed to only the one of the plurality of line cards that is an ingress point into a network element for the LSP represented by that forwarding data structure. ~~said selectively distributing being done and said label forwarding information bases being created apart from distributing to the plurality of routing protocol modules and the routing information base a subset of the forwarding data structures~~, ~~wherein the selective distribution of a particular forwarding data structure to a particular line card is based on an ingress and an egress line card associated with the LSP represented by the particular forwarding data structure.~~

60. (Previously presented) The machine-readable medium of claim 59 wherein the forwarding data structure includes a first field to indicate a port, a second field to indicate a slot, and a third field to indicate a flow.

61. (Previously presented) The machine-readable medium of claim 60 wherein the port is a virtual port and the slot is a virtual slot.

62. (Previously presented) The machine-readable medium of claim 59 further comprising maintaining for each forwarding structure, a data structure that indicates an egress slot and encapsulation information.

63. (Previously presented) The machine-readable medium of claim 62 wherein the data structure further indicates an egress port.

64. (Previously presented) The machine-readable medium of claim 62 further comprising distributing the egress slot and encapsulation information from different ones of the data structures to different ones of the line cards apart from distribution to the plurality of routing protocol modules and the routing information base.

65. (Currently Amended) A method for a network element comprising:

maintaining in a control plane a first data structure that represents a label switched path (LSP), the first data structure indicating a virtual port, a virtual slot, and an identifier to distinguish LSPs of the virtual port and the virtual slot;

maintaining in the control plane a second data structure indicating the first data structure, a slot, encapsulation information, and an index for the slot and the encapsulation information;

selectively distributing the first data structure, the index, and an egress label identifier to only a ~~certain of a set of one or more~~ label forwarding information base (LFIB) on a first line card ~~bases (LFIBS)~~ in a data plane, the ~~LFIBS~~ LFIB being devoid of network layer information, and selectively distributing the first data structure, the index, and the egress label identifier to one or more routing protocol modules in the control plane, wherein the selective distribution to the LFIB ~~LFIBS~~ is based on an ingress point for the LSP ~~an ingress and an egress line card associated with the LSP~~; and

distributing the index and the encapsulation information to only an ~~certain of a set of~~ adjacency data ~~structures~~ structure on a second line card within the data plane based on an egress point for the LSP.

66. (Previously presented) The method of claim 65 wherein the second data structure further indicates a port.

67. (Previously presented) The method of claim 65 wherein the encapsulation information includes an egress label.

IN THE DRAWINGS

The attached replacement sheets include a change to Figures 6, 7B, and 7C.

Figure 6

In Figure 6, "LFIB 415A" has been amended to "LFIB 315A", to be consistent with the written description. The attached replacement sheet which includes Figure 6, replaces the original Figure 6.

Figure 7B

In Figure 7B,

- "PACKET 601A" in the LINE CARD 601A has been amended to "PACKET 701A";
- "PACKET 601A" coupled with the LINE CARD 601A has been amended to "PACKET 701A";
- "ADJACENCY 609" has been amended to "ADJACENCY 709";
- "SWITCHING MEDIUM 603" has been amended to "SWITCHING MEDIUM 703";
- "FORWARDING ENGINE 602C" has been amended to "FORWARDING ENGINE 702C"; and
- "PACKET 601B" has been amended to "PACKET 701B".

In each of the above cases, the amendments were made to be consistent with the written description. The attached replacement sheet which includes Figure 7B, replaces the original Figure 7B.

Figure 7C

In Figure 7C, "319C" has been amended to "316C", to be consistent with the written description. The attached replacement sheet which includes Figure 7C, replaces the original Figure 7C.

Applicant respectfully submits that no new matter has been added by the amendments to Figures 6, 7B, and 7C.

REMARKS

In the Office Action claims 9-14, 18-21, and 56-67 are pending. By way of the present response Applicant has: 1) amended claims 9, 18, 56, 59, and 65; 2) added no claims; and 3) canceled no claims. As such, claims 9-14, 18-21, and 56-67 are now pending. Applicants respectfully request reconsideration of the present application and the allowance of all claims now presented. Applicant submits that no new matter has been added.

Examiner Interview Summary

Applicants thank Examiner for the telephonic interview on February 12, 2008. During the interview, the claims as unamended were discussed in view of the current Office Action. While no agreement on the claims was reached, the Examiner suggested certain claim amendments to clarify Applicants invention. Clarifying amendments to the claims are set forth further herein.

Claim Rejections - 35 U.S.C § 112

Claims 9-14 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. Specifically, the Office Action states that the limitation "distributing forwarding information bases *including network layer information*" is not supported in the specification.[1]

Applicant respectfully submits that the above limitation is supported in the specification. Paragraph 0031 of the specification states that "the routing protocol modules 311A-311J publish information from their routing tables to the routing information base. The information includes the interfaces and/or forwarding structures in the routing tables of the routing protocol modules 311A-311J. The routing information base 313 publishes information as forwarding information bases (FIBs) 317A-317D to a data plane 321." (emphasis added). Interfaces are described in paragraph 0003 of the specification: "Routers typically internally represent each connection (whether it be an IP route, a label switched path, etc.) as an interface or a set of interfaces, which is a network layer entity. Since the interface is a network layer entity, it includes various pieces of information needed for the network layer" (emphasis added). Thus, as the routing information base publishes information as forwarding information bases, and the information

includes interfaces, which include various pieces of information needed for the network layer, the limitation "distributing forwarding information bases including network layer information" is supported in the specification. Applicant respectfully requests withdrawal of the rejection.

Claim Rejections 35 U.S.C. § 103

Claims 9-14, 18-21 and 56-67 are rejected under 35 U.S.C. § 103(a) as being anticipated by Hama, US Patent Publication No. 2004/0202171, (hereinafter Hama"), in view of Gibson, et al., US Patent No. 7,139,278, (hereinafter "Gibson").

Applicant does not admit that Gibson or Hama is prior art and reserves the right to swear behind the references at a later date. Nonetheless, Applicants respectfully submits that Hama in view of Gibson does not teach or suggest all the elements of claims 9-14, 18-21 and 56-67. Furthermore, Applicant does not admit that any claim amendments made in the present response are necessary in light of the cited references and reserves the right of argument in a future response and/or continuing application.

Claims 9 and 59

Applicant respectfully submits that the amended claims 9 and 59 are not anticipated by the combination of Hama and Gibson as the combination of Hama and Gibson does not teach or suggest the required limitations of amended claims 9 and 59.

Amended Claim 9 requires (emphasis added):

maintaining, for network layer switched routes, interface structures each storing a set of network layer information;
distributing each of the interface structures to a set of one or more of a plurality of routing protocol modules;
maintaining a routing information base responsive to the plurality of routing protocol modules;
distributing forwarding information bases (FIBs) including network layer information to each of a plurality of line cards;
maintaining for each of a plurality of label switched paths (LSPs) a forwarding data structure that is separate from the interface structures and that does not include the set of network layer information; and
selectively distributing different ones of the forwarding data structures to different ones of the plurality of line cards to establish label forwarding information bases (LFIBs) devoid of network layer information, wherein the LFIBs are

[1] See Office Action, mailed 12/12/07, page 2.

separate from the FIBs, wherein each forwarding data structure is selectively distributed to only the one of the plurality of line cards that is an ingress point into the network element for the LSP represented by that forwarding data structure.

Thus, claim 9 requires at least a FIBs that include network layer information being distributed to each of a plurality of line cards, for each LSP a forwarding data structure that that does not include network layer information, selectively distributing the forwarding data structures to line cards to establish LFIBs devoid of network layer information, the LFIBs being separate from the FIBs, where each forwarding data structure is selectively distributed to only the one of the plurality of line cards that is an ingress point into the network element for the LSP represented by that forwarding data structure (see amended claim 9).

Hama describes establishing a virtual private network (VPN) where the core network for the VPN is a multi-protocol label switched (MPLS) network and networks for accessing the core network are virtual local area networks (VLANs) (Hama, Abstract). Hama's edge router straddles the MPLS and VLAN networks (Hama, Figure 1), with the each edge router comprising one or more separate subrouters and line cards (Hama, Figure 2, paragraph 0072-0073). There is a subrouter for each VPN the edge router participates in (Hama, Figure 5, paragraph 0075). Each subrouter converts the VLAN VPN traffic to MPLS VPN traffic and visa versa using the subrouter's own VPN forwarding table and the edge router's common MPLS Label Switch Path (LSP) network forwarding table (Hama, Figure 2, paragraphs 0074). The subrouter takes incoming VLAN VPN traffic and converts the VLAN VPN traffic to the appropriate MPLS LSP by swapping the VLAN tag with the LSP label (Hama, Figure 9, paragraph 0087). The subrouter converts the MPLS VPN traffic to VLAN VPN traffic in the reverse fashion (Hama, Figure 9, paragraph 0088). The subrouter then forwards the MPLS traffic out the appropriate line card (Hama, paragraph 0074). The line cards transmit and receive packets and relay the packets to and from the sub-router for the processing described above (Hama, paragraph 0072). Furthermore, Hama describes sharing VPN routing information between different edge routers (Hama, Figure 16, 405, paragraph 0109).

As stated in the Office Action, Hama does not describe "distributing forwarding information bases including network layer information to each of a plurality of line cards;

selectively distributing different ones of the forwarding data structures to different ones of the plurality of line cards to establish label forwarding information bases devoid of network layer information, said selectively distributing being done and said label forwarding information bases being created apart from distributing to the plurality of routing protocol modules and the routing information base a subset of the forwarding data structures, wherein the selective distribution of a particular forwarding data structure to a particular line card is based on an ingress and an egress line card associated with the LSP represented by the particular forwarding data structure" (Office Action mailed on 12/12/07, page 4).

Gibson describes that "it is possible to pre-establish labels for an end-to-end label switched path from a specified source to a specified destination such that no reprocessing of the IP header is necessary" (col. 2, lines 10-13). Gibson further describes establishing LSPs "within existing paths or tunnels in adjacent autonomous systems the interconnection of which can be managed in a dynamic manner without recourse to examination of the IP header" (col. 2, lines 56-60). BGP is used in which a "BGP label identifies both a forwarding interface for a packet and a forwarding behaviour at that interface so as to provide a mapping on to an appropriate label switched path" (col. 3, lines 55-59). BGP notifies the AS of the available routes and this "route information is encoded in a network layer reachability information (NLRI) element" (col. 3, lines 62-65, emphasis added). The possible advertised routes "are stored in the Adj_RIB_In (i.e., the incoming advertised route Information Base) and the active routes are added to the Loc_RIB (i.e., the local Route Information Base)" (col. 5, lines 6-9). "These routes are identified by each having a unique NLRI (network layer reachability information element)" (col. 5, lines 10-11). Applicant respectfully submits that it is well known in the art that a **network layer reachability information (NLRI) element includes network layer information** (e.g., IP address prefixes).[2] Thus, each available route is encoded with a network layer reachability information (NLRI) element (which includes network layer information) and is stored in a Routing Information Base, and the active routes, also encoded with a network layer reachability information (NLRI) element (which includes network layer information), are stored in a Routing Information

[2] See RFC 1654, "A Border Gateway Protocol 4 (BGP-4)", July 1994, page 14 which defines NLRI as: "Network Layer Reachability Information: This variable length field contains a list of IP address prefixes."

Base. These two data structures (the Adj_RIB and the Loc_RIB) which both include network layer information are used to route the packets along the LSP. Thus, while Gibson describe that LSPs may be managed in a dynamic manner without examining the IP header, network layer information is stored in the RIBs that are used in the processing of the MPLS traffic. Thus, Gibson does not describe or suggest a "label forwarding information base devoid of network layer information" as required by claim 9 (emphasis added).

Furthermore, Applicant respectfully submits that the language of Gibson stating "it is possible to pre-establish labels … such that no reprocessing of the IP header is necessary" (Gibson col. 2, lines 10-13) is not the same as, and does not describe, "label forwarding information bases (LFIBs) devoid of network layer information" as required by claim 9. Applicant respectfully submits that not reprocessing an IP header does not suggest a LFIB (label forwarding information base) devoid of network layer information. Not reprocessing an IP header in this case means not re-labeling the packet with the destination IP address in its IP header (see Gibson col. 2, lines 1-3). Not reprocessing an IP header does not suggest that network layer information is not being stored for MPLS processing. In fact, as discussed above, Gibson describes storing **network layer information** as the routes (both available routes and routes currently in use) are stored in RIBs and **include network layer information** (NLRI elements) (see col. 3, lines 62-65; col. 5 lines 6-11). Thus, while Gibson describes "that it is possible to pre-establish labels … such that no reprocessing of the IP header is necessary" Gibson describes **storing network layer information** in routing information bases, and does not describe "label forwarding information bases devoid of network layer information" as required by amended claim 9.

Furthermore, with regards to the limitation "distributing forwarding information bases (FIBs) including network layer information to each of a plurality of line cards" (claim 9), the Office Action takes the position that Gibson describes the above limitation in column 2, lines 38-46. Applicant respectfully submits that the cited portion of Gibson does not describe the above limitation. The cited portion describes routing a packet from a first source with a first LSP to a second source, where "border gateway protocol (BGP) is employed in which a BGP label identifies both a forwarding interface for a packet and a forwarding behaviour at that interface so as to provide a mapping from

said first label switched path on to a second label switched path" to the destination (col. 2, lines 44-49). However, it is unclear to Applicant how the above cited language of Gibson describes "distributing forwarding information bases (FIBs) including network layer information to each of a plurality of line cards" as required by amended claim 9 (emphasis added). Applicant respectfully requests clarification of the rejection if the rejection is maintained.

Even if the cited portion of Gibson (col 2, lines 38-46) describes "distributing forwarding information bases (FIBs) including network layer information to each of a plurality of line cards", this interpretation is inconsistent with the Office Action's rejection for the limitation "selectively distributing different ones of the forwarding data structures to different ones of the plurality of line cards to establish label forwarding information bases (LFIBs) **devoid of network layer information**" (claim 9, emphasis added). The Office Action takes the position that Gibson describes the above limitation, inter alia, in column 2, lines 8-15; lines 56-65; column 3, lines 46-60; column 4, lines 9-60 (Office Action mailed 12/12/07, page 4). However, the cited language of Gibson includes substantially similar language as was cited by the Office Action with regards to the limitation "forwarding information base **including network layer information**". For example, column 3, lines 55-60 of Gibson recites: "In the network arrangement of FIG. 2, a border gateway protocol (BGP) is employed in which a BGP label identifies both a forwarding interface for a packet and a forwarding behaviour at that interface so as to provide a mapping on to an appropriate label switched path." Applicant respectfully submits that the similar cited language (i.e., "a BGP label identifies both a forwarding interface for a packet and a forwarding behaviour at that interface so as to provide a mapping" on to an appropriate label switched path) cannot simultaneously describe "label forwarding information bases (LFIBs) **devoid** of network layer information" and "forwarding information bases (FIBs) **including** network layer information" as required by amended claim 9. Furthermore, the other cited portions of Gibson also do not describe "selectively distributing different ones of the forwarding data structures to different ones of the plurality of line cards to establish label forwarding information bases (LFIBs) **devoid of network layer information**" as required by amended claim 9.

Furthermore, Gibson also does not describe the limitation "wherein each forwarding data structure is selectively distributed to **only** the one of the plurality of line

cards that is an ingress point into the network element for the LSP represented by that forwarding data structure" as required by amended claim 9.

By way of example and not limitation, having an LFIB devoid of network layer information that represents LSPs, that is separate from the FIB, being selectively distributed to certain ones of the line cards in a network element improves performance of LSP processing as compared to a typical FIB processing scheme that is used by typical MPLS enabled network elements. As described in the specification, an interface structure is a network layer entity that includes network layer information (see specification, paragraph 0003). These interfaces are included in the FIBs (see specification, paragraph 0031). Substantial memory savings are realized by not including the network layer information in the representation of an LSP (see specification, paragraph 0024). In addition, using a LFIB devoid of network layer information "enables the support of relatively large numbers of LSPs without reducing performance of a network element. In addition, representing LSPs with such relatively inexpensive structures reduces the amount of resources consumed when downloading LSP information to the control cards of a network element" (specification, paragraph 0024).

By way of further example and not limitation, "as in the control plane, resources of the data plane are conserved because LSPs are represented with forwarding structures. In addition, targeted distribution of LSP information from the control plane provides for further conservation of resources, to the point that a line card may not have any LSP information" (specification, paragraph 0038). For example, if the network element acts a transient router for a particular LSP (i.e., a network element on the LSP between an ingress router and an egress router for the LSP), the line card associated with that LSP may include an LFIB (See Figure 7C; line card 601A with LFIB 315A). Thus, while acting as a transient router for a particular LSP, the network layer information typically associated with a typical MPLS enabled network element for that LSP may not be distributed to, or stored on, the ingress line card for that LSP. However, if the network element acts as an ingress or egress router for a particular LSP, the line cards associated with the LSP may not include an LFIB (See Figure 7A (line card 601D and FIB 317D) and Figure 7B(line card 601A and FIB 317A)).

As the combination of Hama and Gibson does not teach or suggest the required limitations in amended claim 9, Applicants respectfully request withdrawal of the rejection and allowance of the claim. As claims 10-14 depend directly or indirectly on amended claim 9, Applicant respectfully submits that claims 10-14 are allowable for at least the same rationale.

Applicant respectfully submits that amended Claim 59 is a machine readable medium version of amended claim 9 and is allowable for at least the same rationale. Additionally, as claims 60-64 depend directly or indirectly on amended claim 59, Applicant respectfully submits that claims 60-64 are allowable for at least the same rationale.

Claim 18

Applicant respectfully submits that amended claim 18 is not anticipated by the combination of Hama and Gibson as the combination of Hama and Gibson does not teach or suggest the required limitations in amended claim 18.

Amended claim 18 recites (emphasis added):

18. A network element comprising:
a plurality of line cards;
a control card having stored therein,
a plurality of interface structures having stored therein network layer information;
a plurality of routing protocol modules coupled to one or more of the plurality of interface structures;
a routing information base (RIB) coupled to said plurality of routing protocol modules;
a plurality of forwarding data structures devoid of network layer information separate from the interface data structures, the plurality of forwarding data structures each having stored therein information to determine forwarding of packets from an ingress one of said plurality of line cards to an egress one of said plurality of line cards for a label switched path (LSP);
a label manager to selectively distribute different ones of the forwarding data structures to different ones of the plurality of line cards and to selectively distribute a subset of the plurality of forwarding data structures to the plurality of routing protocol modules, wherein a particular one of the forwarding data structures is selectively distributed to a particular one of the line cards only if that line card

is an ingress point into the network element for the LSP represented by the particular forwarding data structure; and

a first of said plurality of line cards having stored therein,

a label forwarding information base (LFIB) generated from at least certain of said plurality of forwarding data structures indicating that the first line card is an ingress point into the network element for the label switched paths (LSPs) represented by the plurality of forwarding data structures, the label forwarding information base (LFIB) being devoid of network layer information; and

a network layer forwarding information base (FIB) generated from said routing information base (RIB).

Thus, amended claim 18 requires at least, a plurality of line cards, a control card including interface structures storing network layer information, a RIB, forwarding data structures devoid of network layer information that represent LSPs, and a label manager to selectively distribute different ones of the forwarding data structures to different ones of a plurality of line cards if that line card is an ingress point into the network for the LSP. In addition, amended claim 18 requires at least a line card having a LFIB devoid of network layer information generated from certain ones of the forwarding data structures and indicates the line card is an ingress point into the network element for the LSP represented by those forwarding data structures, and a FIB generated from the RIB (see amended claim 18).

Applicant respectfully submits that the combination of Hama and Gibson does not teach or suggest a "label forwarding information base (LFIB) being **devoid of network layer information**" as required by claim 18 for reasons similar to those discussed above in reference to amended claim 9.

Furthermore, Applicant respectfully submits that the combination of Hama and Gibson does not teach or suggest "a label manager to selectively distribute different ones of the forwarding data structures to different ones of the plurality of line cards … wherein a particular one of the forwarding data structures is selectively distributed to a particular one of the line cards **only** if that line card is an ingress point into the network element for the LSP represented by the particular forwarding data structure" as required by amended claim 18.

Furthermore, Applicant respectfully submits that the combination of Hama and Gibson does not teach or suggest a line card both with an LFIB "devoid of network layer

information" "indicating that the first line card is an ingress point into the network element for the label switched paths (LSPs) represented by the plurality of forwarding data structures" and a FIB generated from the RIB.

As the combination of Hama and Gibson does not teach or suggest the required limitations in claim 18, Applicant respectfully requests withdrawal of the rejection and allowance of the claim. As claims 19-21 depend directly or indirectly on claim 18, Applicant respectfully submits that claims 19-21 are allowable for at least the same rationale.

Claims 56 and 65

Applicant respectfully submits that amended claims 56 and 65 are not anticipated by the combination of Hama and Gibson as the combination of Hama and Gibson does not teach or suggest the required limitations in amended claims 56 and 65.

Amended Claim 56 recites (emphasis added):

> 56. A machine-readable medium that provides instructions, which when executed by a set of one or more processors, cause said set of processors to perform operations comprising:
> maintaining in a control plane a first data structure that represents a label switched path (LSP), the first data structure indicating a virtual port, a virtual slot, and an identifier to distinguish LSPs of the virtual port and the virtual slot;
> maintaining in the control plane a second data structure indicating the first data structure, a slot, encapsulation information, and an index for the slot and the encapsulation information;
> selectively distributing the first data structure, the index, and an egress label identifier to only a label forwarding information base (LFIB) on a first line card in a data plane, the LFIB being devoid of network layer information, and selectively distributing the first data structure, the index, and the egress label identifier to one or more routing protocol modules in the control plane, wherein the selective distribution to the LFIB is based on an ingress point for the LSP; and
> distributing the index and the encapsulation information to only an adjacency data structure on a second line card within the data plane based on an egress point for the LSP.

Applicant respectfully submits that the combination of Hama and Gibson does not teach or suggest a "label forwarding information base" "(LFIB) being **devoid of**

network layer information" as required by amended claim 56 for reasons similar to those discussed above in reference to amended claim 9.

Furthermore, Applicant respectfully submits that the combination of Hama and Gibson does not teach or suggest "selectively distributing the first data structure, the index, and an egress label identifier to **only** a label forwarding information base (LFIB) on a first line card in a data plane … wherein the selective distribution to the LFIB is based on an ingress point for the LSP" as required by amended claim 56.

Furthermore, Applicant respectfully submits that the combination of Hama and Gibson does not teach or suggest "selectively distributing the first data structure, the index, and the egress label identifier to one or more routing protocol modules in the control plane" as required by amended claim 56. By way of example and not limitation, certain routing protocol modules in the control plane may use an LSP for routing purposes. However, in more situations the routing protocol modules do not use LSPs. Thus, resources are used inefficiently if all forwarding structures for LSPs are distributed to the routing protocol modules. Thus, resources are conserved by selectively distributing those forwarding structures to the routing protocol modules (see specification, paragraph 0029). By way of example and not limitation, forwarding structures for LSPs are distributed to the routing protocol modules that have registered interest in those forwarding structures (specification, paragraph 0030).

As the combination of Hama and Gibson does not teach or suggest the required limitations in claim 56, Applicant respectfully requests withdrawal of the rejection and allowance of the claim. As claims 57-58 depend directly or indirectly on claim 56, Applicant respectfully submits that claims 57-58 are allowable for at least the same rationale.

Applicant respectfully submits that Claim 65 is a method version of claim 56 and is allowable for at least the same rationale. Additionally, as claims 66-67 depend directly or indirectly on claim 65, Applicant respectfully submits that claims 66-67 are allowable for at least the same rationale

CONCLUSION

Applicant respectfully submits that all rejections have been overcome by the remarks and that all pending claims are in condition for allowance. Accordingly, Applicant respectfully requests withdrawal of the claim rejections.

Invitation for a telephone interview

If a telephone conference would facilitate the prosecution of this application, Examiner is invited to contact Daniel M. DeVos at (408) 720-8300. If there are any additional charges, please charge them to our Deposit Account Number 02-2666.

Respectfully Submitted,

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